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10/696,052	10/28/2003	Philippe Caze	SP02-227	5896
22928	7590	04/11/2007		
CORNING INCORPORATED			EXAMINER	
SP-TI-3-1			LEUNG, JENNIFER A	
CORNING, NY 14831				
			ART UNIT	PAPER NUMBER
			1764	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/11/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/696,052

Applicant(s)

CAZE ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 3, 4, 10-13 and 19-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-9 and 14-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-25 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Jennifer A. Leung
4/9/2007

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10-28-03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-18, in the reply filed on January 31, 2007 is acknowledged. In addition, Applicant's election of species A1 (i.e., wherein the microchannel walls are of glass) and B1 (i.e., wherein the catalyst support is a sol binder) is acknowledged. The claims in Group I that are readable on species A1 and B1 include claims 1, 2, 5-9 and 14-18. Therefore, claims 3, 4, 10-13 and 19-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention/species, there being no allowable generic or linking claim.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Europe on October 29, 2002. It is noted, however, that applicant has not filed a certified copy of the EP 02292688.5 application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

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the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 5-9 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich et al. (WO 01/12312) in view of Hammel et al. (US 4,803,188).

Regarding claims 1, 2 and 7, Tonkovich et al. (for example, page 7, line 29, to page 9, line 2; page 10, line 16, to page 12, line 6) discloses an apparatus comprising:

a plurality of microchannel walls (i.e., defined by porous material **106**; see FIGs. 1-6 and 7b) defining at least one microchannel **100**; wherein at least one coating layer is adhered to the plurality of microchannel walls **106**, and wherein said coating layer may include a catalyst support and a catalyst (i.e., porous material **106** may be coated with a second porous material **600** acting as a support for catalyst **108**, see FIG. 6 and page 9, lines 24-28; see also page 11, lines 26-29).

Tonkovich et al. discloses that, "the porous material **106** may be a porous support of non-catalytic material with catalytic material **108** placed thereon," (see page 8, lines 28-29), such as a material comprising metal, ceramic or composite (see page 11, lines 26-29). Tonkovich et al., however, is silent as to whether the porous material **106** may consist of, specifically, a glass frit.

Hammel et al., as best understood, teaches a glass frit (i.e., a microporous glass; see column 1, lines 15-27; column 2, line 5 to column 3, line 14; see also Example 1), the glass being suitable for supporting a catalyst material.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to select a glass frit for forming the porous material **106** of the microchannel walls in the apparatus of Tonkovich et al., on the basis of suitability for the intended use and absent a

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showing of unexpected results thereof, because the mechanical strength, thermal stability, crush strength, and dimensional stability inherent of the microporous glass (glass frit) would make the material highly suitable as a catalyst support, as taught by Hammel et al.

Regarding claim 5, Tonkovich et al. discloses that at least one of the plurality of microchannel walls may further comprise a porous membrane (e.g., the apparatus may be configured such that products diffuse through the porous material **106**; see FIG. 3 and page 9, lines 3-7).

Regarding claim 6, the modified apparatus of Tonkovich et al. structurally meets the limitations set forth in this product-by-process claim because the claimed product is the same as, or obvious from, the product of the prior art. The determination of patentability is based on the product itself (i.e., at least one coating layer **600,108** on at least one microchannel wall **106**), and not its method of production (i.e., by slurry application). If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). In any event, Tonkovich et al. further discloses that the coating layer may be applied to the microchannel walls by filling the microchannel with a slurry (e.g., via a slurry dipping method; see Examples 1 and 2).

Regarding claims 8 and 9, Tonkovich et al. further discloses that the catalyst support may comprise alumina (e.g., a catalyst of Rh-MgO/Al₂O₃; see Example 1). Although Tonkovich et al. is silent as to the use of a sol binder in the coating process, the modified apparatus of Tonkovich et al. structurally meets the limitations set forth in this “product-by-process” claim because the claimed product is the same as, or obvious from, the product of the prior art. Even

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though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claims 14 and 15, Tonkovich et al. discloses that the catalyst material may comprise a material selected from group IVA, VA, VIIA and VIII of the periodic table (see page 11, lines 30-32), wherein the catalyst material is suitable for conducting a variety of catalytic processes (see listing on page 12, lines 16-27). Although Tonkovich et al. does not specifically disclose that the catalyst material comprises platinum, nickel oxide, silicon carbide, or silicon nitride, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate catalyst material for the apparatus of Tonkovich et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof (i.e., for conducting a particular catalytic process within the apparatus, such as one of the processes indicated at page 12, lines 16-27).

Regarding claims 16-18, because the microstructure of Tonkovich et al. comprises each of the claimed structural components, the microstructure should, inherently, be capable of operating under an internal pressure within the instantly recited ranges, absent a showing otherwise. Tonkovich et al., as an example, further discloses that for the particular catalytic process of steam reforming, the apparatus is capable of operating under a pressure range from 0 to 350 psig (see Example 3), which is well within the instantly recited ranges.

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4. Claims 1, 2, 5-9 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Claus et al. (*Catalysis Today* 67 (2001) 319-339) in view of Hammel et al. (US 3,843,341).

Regarding claims 1 and 2, Claus et al. discloses an apparatus (see section 4.1, beginning on page 328; see also, section 5. *Catalysis-on-a-chip* and section 6. *Multibatch reactors for the fast screening of gas-liquid reactions*) comprising:

a plurality of microchannel walls defining at least one microchannel (i.e., defined by each microstructured inlay; see FIGs. 10a, 10b; see also FIG. 12(a)); at least one coating layer adhered to the plurality of microchannel walls defining said at least one microchannel, the coating layer including a catalyst support and a catalyst (i.e., "Each microreactor is then filled with a microstructured inlay containing one catalyst as a catalytic active coating on top of its microchannels," page 328, first paragraph under section 4.1); wherein the coating layer includes a catalyst support and a catalyst (e.g., see FIG. 12(c) and 12(d), wherein Ag or Ru catalyst is supported on Al_2O_3). Claus et al. further discloses that the microstructured catalyst inlays may be made of glass (see page 328, second column, last paragraph).

Claus et al., however, does not specifically indicate that the glass comprises a glass frit.

Hammel et al., as best understood, teaches a glass frit (i.e., a microporous glass; see column 1, lines 15-27; column 2, line 5 to column 3, line 14; see also Example 1), the glass being suitable for supporting a catalyst material.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to select a glass frit for forming the plurality of microchannel walls in the apparatus of Claus et al., on the basis of suitability for the intended use thereof, because the mechanical strength, thermal stability, crush strength, and dimensional stability inherent of a microporous

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glass (glass frit) would have made the material highly suitable as a catalyst support, as taught by Hammel et al.

Regarding claim 5, the microporous glass material defining each of the microstructured inlays of the modified apparatus will inherently define a porous membrane, since a gas is inherently capable of diffusing through the pores within the glass material (e.g., depending on the combination of a particular gas and a particular pore size of the glass).

Regarding claim 6, the modified apparatus of Claus et al. structurally meets the limitations set forth in this product-by-process claim because the claimed product is the same as, or obvious from, the product of the prior art. The determination of patentability is based on the product itself (i.e., at least one coating layer on at least one microchannel wall), and not its method of production (i.e., by slurry application). If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claim 7, Claus et al. discloses that the coating layer may comprise a plurality of coating layers (i.e., mixtures of different active components obtained by sequential wet impregnation; see section 4.5.1 *Library preparation*, on page 333).

Regarding claims 8 and 9, Claus et al. discloses that the catalyst support may comprise alumina (e.g., see FIG. 12(c) and 12(d), wherein Ag or Ru catalyst is supported on Al₂O₃; see also section 4.5.1 *Library preparation*). Although Claus et al. does not specifically disclose the use of a sol binder in the coating method, the modified apparatus of Claus et al. structurally meets the limitations set forth in this “product-by-process” claim because the claimed product is

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the same as, or obvious from, the product of the prior art. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). In any event, Claus et al. discloses that the use of sol-gel deposition of catalyst coating layers is conventional in the art (see page 320, first column, third paragraph), and also, the exemplary coating layer of Ru-Al₂O₃ in FIG. 12(d) is formed by sol-gel deposition.

Regarding claims 14 and 15, Claus et al. discloses that the catalyst may comprise a material selected from the group consisting of groups IVA, VA, VIIA and VIII of the periodic table, including platinum (see, for example, page 333, under section 4.5.1 *Library preparation*).

Regarding claims 16-18, because the microstructure apparatus of Claus et al. comprises each of the claimed structural components, the microstructure apparatus should, inherently, be capable of operating under an internal pressure within the instantly recited ranges, absent a showing otherwise. Claus et al. further discloses that the apparatus may be configured as a chip-based system, wherein the apparatus is capable of operating at internal pressures up to 117 bar (see page 337, beginning at the second paragraph).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined

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application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1, 2, 5-9 and 14-18 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-17 of copending Application No. 11/016,093. Although the conflicting claims are not identical, they are not patentably distinct from each other.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Regarding claims 1 and 2, Application '093 similarly claims a microstructure comprising: a plurality of microchannel walls defining at least one microchannel (see claim 1); at least one coating layer adhered to the plurality of microchannel walls defining said at least one microchannel, the coating layer including a catalyst support and a catalyst (see claim 1); wherein the plurality of microchannel walls, as best understood, comprise a frit of a material consisting of glass (see claim 2; also, claims 10, 14, 17).

Regarding claim 5, Application '093 similarly claims that at least one of the plurality of microchannel walls further comprise a porous membrane (see claims 3 and 4).

Regarding claim 6, the microstructure of Application '093 structurally meets the limitations set forth in this product-by-process claim because the claimed product is the same as, or obvious from, the product of the prior art. The determination of patentability is based on the product itself (i.e., at least one coating layer on at least one microchannel wall), and not its method of production (i.e., by slurry application). If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). In any event, Application '093 similarly claims that at least one coating layer is applied to the plurality of microchannel walls by filling the at least one microchannel with a slurry (see, for example, claims 10 and 17).

Regarding claim 7, Application '093 similarly claims that the at least one coating layer comprises a plurality of coating layers (see claim 5).

Regarding claim 8, Application '093 similarly claims that the catalyst support comprises a sol binder (see claim 1; also claim 10).

Regarding claim 9, Application '093 is silent as to claiming that the sol binder comprises alumina. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an alumina sol binder for the sol binder in Application '093, on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the Examiner takes Official Notice that alumina is a well known and widely used catalyst support material in the art.

Regarding claims 14, Application '093 similarly claims that the catalyst comprises a material selected from the group consisting of group IVA, VA, VIIA and VIII of the periodic

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table of elements (see claim 8).

Regarding claim 15, Application '093 similarly claims that the catalyst comprises a material selected from the group consisting of platinum, nickel oxide, silicon carbide and silicon nitride (see claim 9).

Regarding claims 16-18, because the microstructure of Application '093 comprises each of the claimed structural components, the microstructure should, inherently, be capable of operating under an internal pressure within the instantly recited ranges, absent a showing otherwise.

6. Claims 1, 2, 5, 6 and 16-18 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of copending Application No. 11/016,645. Although the conflicting claims are not identical, they are not patentably distinct from each other.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Regarding claims 1 and 2, as best understood, Application '645 similarly claims a microstructure comprising:

a plurality of microchannel walls (e.g., defined by the porous membrane, first plate and second plate; see claim 1) defining at least one microchannel (e.g., a first microchannel and a second microchannel; see claim 1); at least one coating layer adhered to the plurality of microchannel walls defining said at least one microchannel, the coating layer including a catalyst support and a catalyst (e.g., a microporous material comprising a catalyst; see claims 12 and 13); wherein the plurality of microchannel walls comprise a frit of glass material (see claims 1 and 5;

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a mesoporous or macroporous membrane made of glass; also, first and second plates made of glass; see claims 1, 4 and 5).

Regarding claim 5, Application '645 similarly claims that the at least one of the plurality of microchannel walls further comprises a porous membrane (see claim 1).

Regarding claim 6, the microstructure of Application '645 structurally meets the limitations set forth in this product-by-process claim because the claimed product is the same as, or obvious from, the product of the prior art. The determination of patentability is based on the product itself (i.e., at least one coating layer on at least one microchannel wall), and not its method of production (i.e., by slurry application). If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claims 16-18, because the microstructure of Application '645 comprises each of the claimed structural components, the microstructure should, inherently, be capable of operating under an internal pressure within the instantly recited ranges, absent a showing otherwise.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for

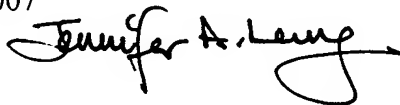
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the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung

April 9, 2007

A handwritten signature in black ink that reads "Jennifer A. Leung". The signature is written in a cursive style with a large, stylized "J" and "L".